MAR 19680045: NORTHERN ALBERTA

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PHOTOGEOLOGICAL STUDY

SULPHUR PROSPECTING PERMIT NO. 35

NORTHERN ALBERTA

Prepared For

Spooner Mines and Oils Limited

June, 1968

J. C. SPROULE AND ASSOCIATES LTD.
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SULPHUR PROSPECTING PERMIT NO. 35

NORTHERN ALBERTA

INTRODUCTION

This report has been prepared at the request of Mr. Noble Harbinson, acting for Spooner Mines and Oils Limited, hereinafter referred to as the "Company." The request made was for a photogeological analysis of the Company's Sulphur Prospecting Permit No. 35, integrated with other available geological information. A sketch map, Figure 1, shows the general geological setting of the Company permit and the relationship to known sulphur occurrences in the area. Figure 2 presents the results of this preliminary study on a photogeological mosaic.

The immediate objective of the photogeological study was to identify from the study of aerial photographs those areas that, from our present knowledge. would be the most favourable from the standpoint of the occurrence of sulphur. Such areas could then be examined in the field to determine the presence or absence of sulphur.

The Permit concerned comprises a total area of approximately 19,840 acres.

General background information pertaining to the development of the sulphur play in northern Alberta, regional geological setting and mode of occurrence has been presented earlier in a preliminary geological report prepared for Cam

Mines, a company that is affiliated with Spooner Mines and Oils Limited in this project. That report was entitled, "Geological Report, Alberta Sulphur Prospecting Permits Nos. 11, 21, 22, 23 and 35, North-Central Alberta," and was dated February 23, 1968. Most of the general details given in that report will not be repeated here. This report will rather present more detailed information on the prospects of the Permit concerned.

BEDROCK GEOLOGY AND TOPOGRAPHY

Most of the area of the Permit concerned is located within the area underlain by Paleozoic (Devonian) rocks, although the northwest edge of the Permit is underlain by Cretaceous. From the standpoint of the regional occurrence of sulphur, therefore, this Permit is relatively well located (see Figure 1).

The Cretaceous rocks consist of shales, sandy shales and sandstones. The Devonian rocks consist of limestones, dolomites, shales and evaporites. Outcrops of bedrock are sparse. Cretaceous rocks are poorly consolidated and bentonitic in character. Slumping is common in these sediments along the steeper slopes and stream cuts. The Devonian limestones and dolomites, being more resistant to erosion, create chutes and rapids on the Peace River between Vermilion Rapids and Vermilion Falls (Figure 1). Other Devonian outcrops are present downriver from Vermilion Falls, as well as along Harper Creek in the extreme southeastern part of the map.

The bedrock, whether of Devonian or Cretaceous age, is overlain by a variable thickness of glacial till, glacio-lacustrine and recent deposits.

The general topography of the area has not been altered significantly by glaciation. Large topographic features, such as the Caribou Mountains to the west, represent pre-glacial erosional remnants rising abruptly from 1,000 feet to 2,000 feet above the surrounding lowlands.

SUPERFICIAL GEOLOGY IN RELATION TO SULPHUR OCCURRENCE

The superficial geology of the area is of particular interest to the subject of possible economic occurrences of sulphur because of the probability that any economic deposits in this area are in superficial deposits.

The last glacier to cover the subject area was of Wisconsin age. Dating by 'carbon 14' method indicates that this advancement over the region occurred over 31,000 years ago. Ice flow features on the Glacial Map of Canada indicate that this glacier came from an area west of Hudson Bay. The thickness of the glacier is estimated to have been approximately 5,000 feet (Bayrock, 1960)(1) and the average direction of flow in the subject area was to the west-southwest.

The absence of terminal moraines and other ice marginal features indicates that the retreat of the glacier was mainly by rapid stagnation. Dead-ice moraine forms the surface or underlies lacustrine deposits over much of the area.

As the glacier retreated, the lowland to the northwest was blocked by ice and meltwaters and could not drain freely. Extensive proglacial and superglacial lakes were formed, resulting in the deposition of glacio-lacustrine deposits that vary in thickness from a few inches to fifty feet.

Several periods of still-stand of one of these Pleistocene lakes are suggested by R. S. Taylor (1960) from mapped deposits in the Peace River Valley. Three large areas of sandy aeolian and alluvial material, adjacent to the modern Peace River at elevations of approximately 1,400 feet, 1,100 feet, and 900 feet above sea-level, are interpreted as deltas that have been partly reworked into dunes by wind action. The lowest occurring, and by far the largest, of these sandy deposits is in the subject area. It commences on the west side of the

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(1) Names and dates in brackets are referred to in the Bibliography at the end of this report.

mapped area, near Vermilion Chutes, and extends to the northeast adjacent to the Peace River. It also covers most of the area south of the Peace River with the exception of some of the areas of higher ground. The eastern limits extend beyond the mapped area. Present-day drainage was established soon after the lakes were drained and conforms generally to pre-glacial lowlands.

From our overall sulphur studies in the general area we concluded that the most likely sources of commercial sulphur are superficial deposits. It is of interest in this connection to note that the nearby reservoir of McMurray oil, reputed to amount to about 600 billion barrels of oil-in-place, contains four to five percent sulphur by weight. The sulphur in this oil reservoir would, therefore, amount to about eight to ten billion long tons. Since that sulphur is also of secondary origin, probably common to the present occurrences, it is not impossible to postulate the occurrence of commercial deposits in the area, other than in the oil sands.

We also conclude from our regional studies of the sulphur prospects of the subject area that superficial deposits of sulphur are most likely to occur in muskegs, lakes or in abandoned lacustrine depressions, with particular reference to such areas that are along or adjacent to fractures and/or faults responsible for sulphate water springs.

PHOTOGEOLOGICAL STUDY

WITH RECOMMENDATIONS FOR FIELD EVALUATION

With the exception of those areas designated as muskeg on the enclosed mosaic, the subject Permit is characterized by topography that slopes gently to the southeast toward the Peace River. Vegetation covers a large part of the area. Judging from the variation in tone of this vegetative cover on the aerial photographs, both deciduous and evergreen trees are present. The darker tones generally

represent stands of spruce whereas the lighter tones indicate aspen or birch. The type of vegetation present in an area is a factor of soil texture and drainage but might also reflect the presence or absence of certain minerals.

Photo alignments, interpreted to indicate bedrock faulting and/or fracturing, are the dominant structural features in the study area. A general northwest-southeast fracture trend is present within the subject Permit. This trend is bisected near the centre of the Permit by a prominent northeast-southwest pattern of alignments. Associated with and developed along these apparent fracture trends are depressional features that are currently inhabited by muskeg. From our present knowledge, we believe that these areas are the most favourable for the occurrence of sulphur and that such deposits are likely to be at or near the surface. The areas of particular interest are at or near the intersections of the above two fault and/or fracture zones.

The following areas of special interest within Sulphur Prospecting Permit No. 35 are recommended for field examination.

'Area 1' is located in the extreme southeast part of the Permit. A certain resemblance is noted between this area and the general area of sulphur occurrence on Sulphur Prospecting Permit No. 8 to the southwest. Similar features are a lack of vegetative development locally in a region of fairly good vegetation growth, the occurrence of what appears to be small lakes or muskegs that are now dried up due to the dropping water table, and a northwest-southeast fracture pattern.

'Area 2' is a linear development of muskeg trending diagonally across the Permit from northeast to southwest. The general area seems to be drained intermittently to the southeast and southwest, but numerous local closed areas of possible sulphur deposition are present along this trend and should be investigated in the field.

'Area 3' is similar to 'Area 2' but is located nearer the inferred Cretaceous-Devonian contact. The fracture pattern developed here trends more to the northwest-southeast.

It would be desirable to concentrate initial field studies in the numerous small muskeg areas away from drainage channels and in the immediate vicinity of principal fracture trends. Of special interest are possible closed and dried up muskegs.

CONCLUSIONS AND RECOMMENDATIONS

From our overall sulphur studies in the general area we concluded that the most likely sources of commercial sulphur are superficial deposits.

We also conclude from our regional studies of the sulphur prospects of the subject area that superficial deposits of sulphur are most likely to occur in muskegs, lakes or in abandoned lacustrine depressions, with particular reference to such areas that are along or adjacent to fractures and/or faults responsible for sulphate water springs.

We have determined that a number of such features show well on the photomosaics and these areas have been outlined on the accompanying Figure 2, a photogeological mosaic.

In view of the above, it is recommended that a field check of representative localities within the subject Permit be made by a helicopter-borne geological crew. This crew should be prepared to conduct spot-sampling trenching and/or auger testing as the occasion demands. We are, however, not yet prepared to recommend that the Company conduct the full detailed field geological survey described in our letter of February 6, 1968. It is proposed rather that the Company authorize the preliminary field check referred to above at a total cost of $750 for the Permit under consideration. The results of that preliminary field work

will then inform the Company as to whether or not the full-scale field work referred to in our letter of February 6 should be proceeded with. If the preliminary results do not indicate that further work should be done, it would then be recommended that the Company apply immediately for return of their $2,500 deposit for the Permit.

[redacted]

V. A. Farley

[redacted]

J. C. Sproule, P. Geol.

1009 Fourth Avenue S.W.,
Calgary, Alberta.
June 29, 1968.
VAF/JCS/fc

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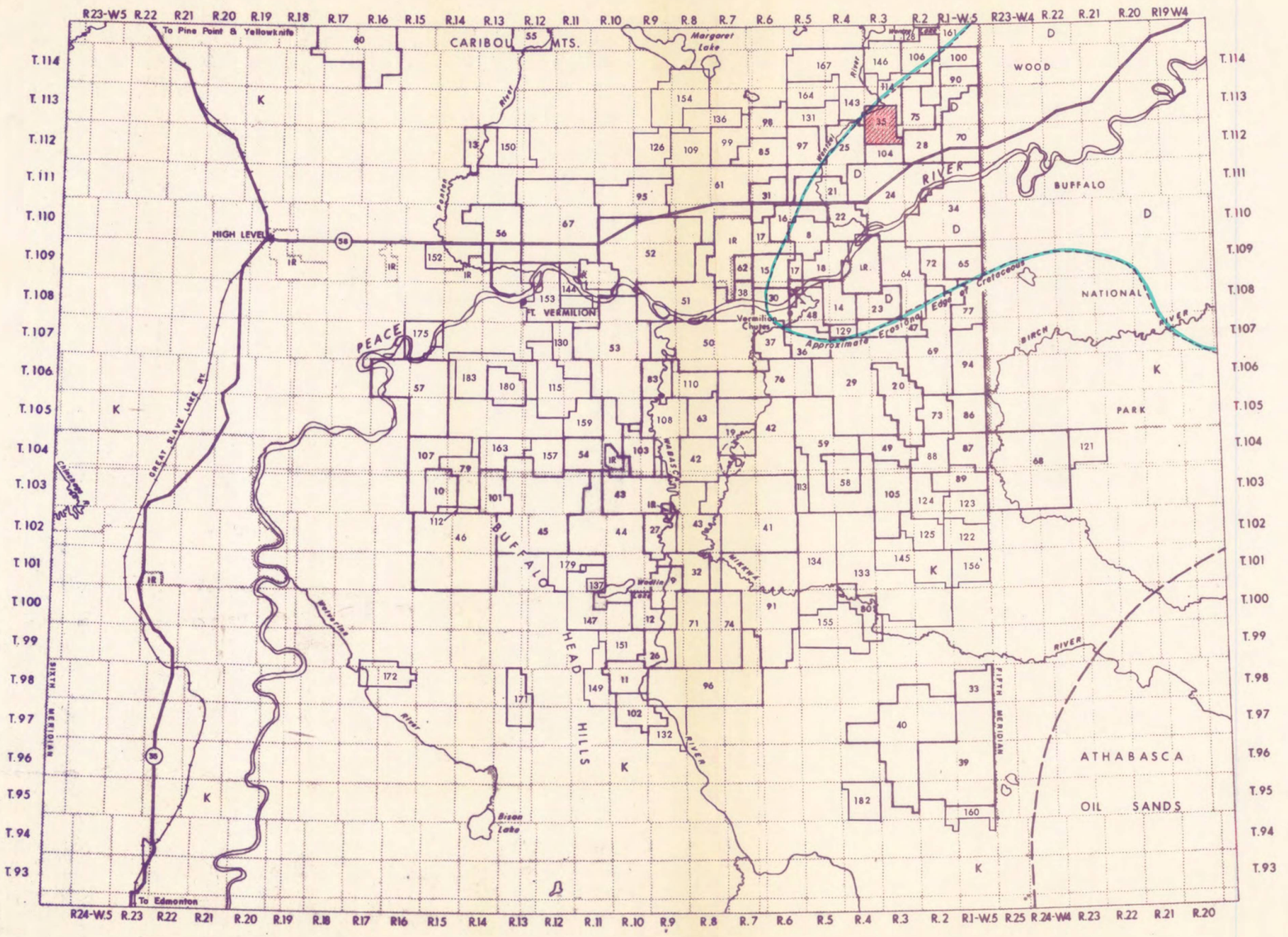
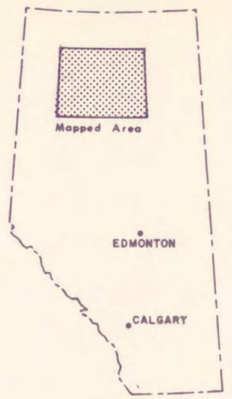


INDEX MAP



LEGEND

- K — Cretaceous Formations
- D — Devonian Formations
- 17 — Sulphur Prospecting Permit
- A — Permit Applied For
- Permit in which Spooner Mines and Oils Limited has interest

NORTH – CENTRAL ALBERTA

showing

SULPHUR PERMIT 35 IN WHICH SPOONER MINES AND OILS LIMITED HAS INTEREST

with reference to

REGIONAL SURFACE GEOLOGY AND PERMITS HELD BY OTHERS

0 16 32 48

SCALE: 1" to 16 MILES

NOTE: Permits as Published to March 29, 1968 (Data on later permits not yet available)

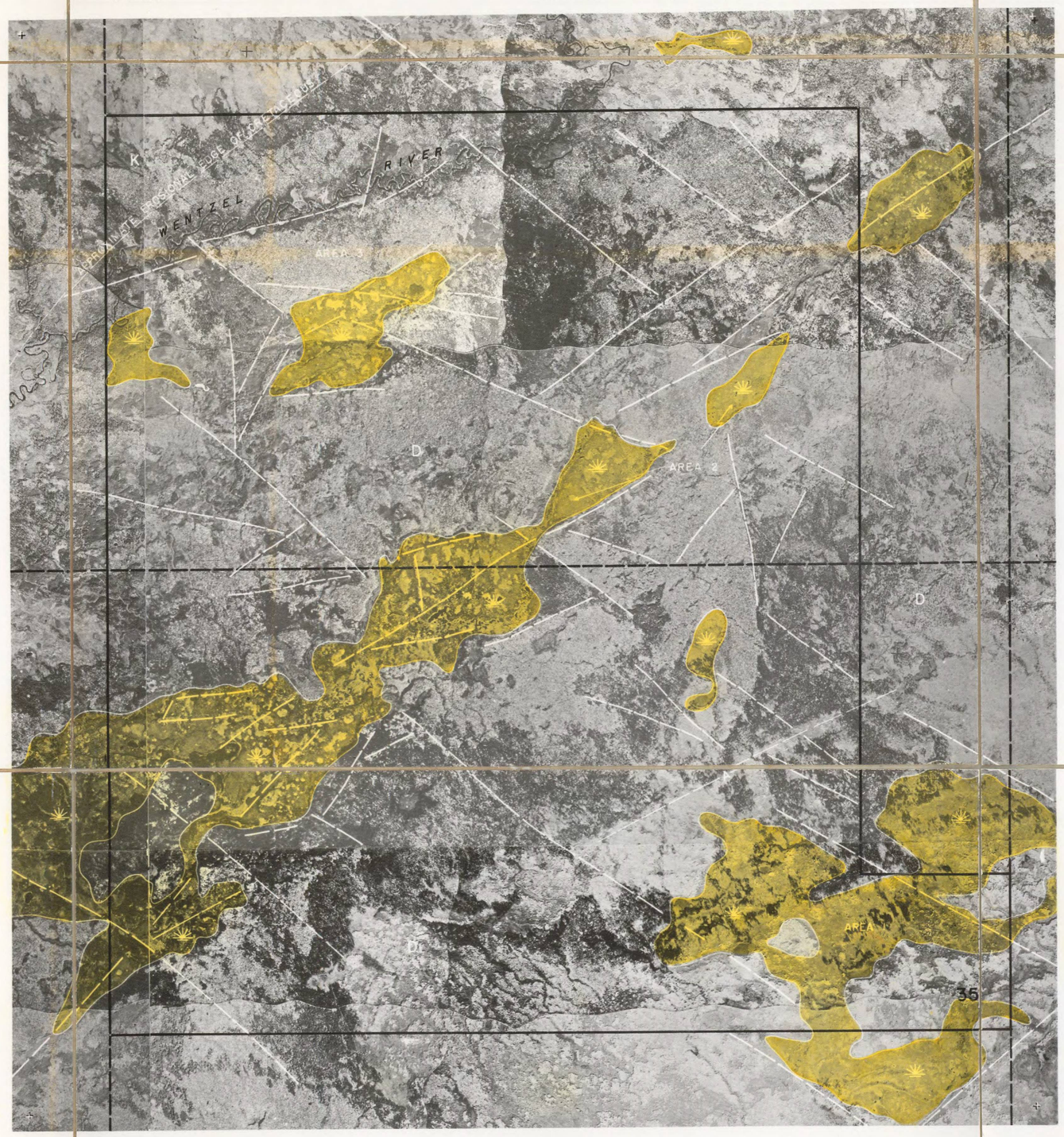
7908

J.C. SPROULE AND ASSOCIATES LTD, CALGARY

114° 30'

R.3·W.5

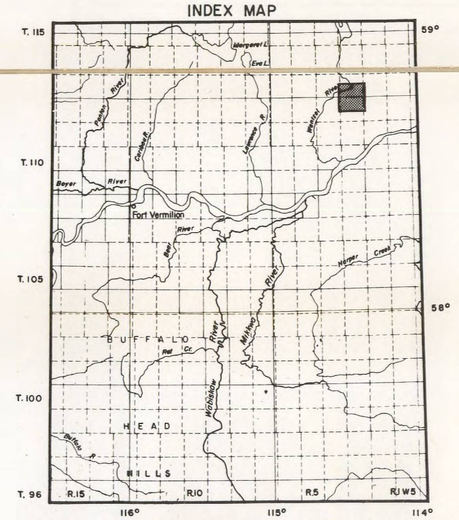
T. 113



T. 112

58° 45'

INDEX MAP



LEGEND

SURFICIAL DEPOSITS
- Muskeg

BEDROCK FORMATIONS
- K — Cretaceous (Undifferentiated)
- D — Devonian (Undifferentiated)

PHOTOGEOLOGICAL SYMBOLS
- Approximate erosional edge of Cretaceous
- Alignment interpreted to indicate faulting or fracturing in bedrock
- A — Alignment of probable geological significance
- AREA 1, 2 etc. — Areas of interest discussed in report
- 21 — Sulphur prospecting permit outline

PHOTOGEOLOGICAL MOSAIC
SULPHUR PROSPECTING PERMIT
No. 35.
FORT VERMILION AREA
ALBERTA

PREPARED FOR

SPOONER MINES & OILS LTD.

Mi. 1 1/2 0 1 2 3 Mi.

APPROXIMATE SCALE IN MILES

THIS IS A SEMICONTROLLED MAP-MOSAIC AND SHOULD NOT BE MISTAKEN FOR AN ACCURATE GEOGRAPHIC BASE

J.C. SPROULE AND ASSOCIATES LTD. CALGARY, ALBERTA

APRIL 1968

19680045

FIGURE 2

SULPHUR PROSPECTING PERMIT NO. 35